

# CHARACTERISTICS AND SIGNIFICANCE OF SONG IN FEMALE ORIENTAL MAGPIE-ROBIN, *COPSYCHUS SAULARIS*<sup>1</sup>

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(With one text-figure)

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Singing behaviour of the female Oriental magpie-robin, *Copsychus saularis* was studied. The female sings occasionally for a short period in the presence of the male. The song consists of phrases made up of different elements. The minimum, maximum and range of frequencies were found to be  $2.42 \pm 0.03$ ,  $5.03 \pm 0.08$  and  $2.61 \pm 0.02$  kHz, respectively while the duration of the phrases were  $1.38 \pm 0.02$  sec, followed by an interval of  $1.49 \pm 0.03$  sec. It appears that the female magpie-robin's song helps to stimulate the male to sing.

## INTRODUCTION

Bird song performs a variety of functions (Ali 1996). In most passerine species, song is the characteristic of the male and is used for territorial defence through advertisement and mate acquisition (Cooney and Cockburn 1995, Bhatt *et al.* 2000). Besides these two functions, birds also use the song to synchronize breeding behaviour, mate guarding, mate recognition, parent-offspring recognition and neighbour-stranger discrimination (Weary *et al.* 1992, Lambrechts and Dhondt 1995). The song in the female has also been studied in many passerine species. In some species it is rare, while in others the females normally sing duets with males (Ridgely and Tudor 1989). The major functions of the song of the female include territorial defence, prevention of polygyny and intra-pair communication (Flood 1990).

In the present study, an attempt has been made to investigate physical characteristics and functional significance of the song in the female Oriental magpie-robin, *Copsychus saularis*.

## METHODOLOGY

The Oriental magpie-robin breeds during March to August in northern India (Ali 1996, Roberts 1992, Kumar 1999). Songs of five females were recorded from March 1997 to August 1998, at Haridwar ( $29^{\circ} 55' N$ ,  $78^{\circ} 8' E$ ), using a JVC Zoom MZ-500 unidirectional microphone and a SONY CFS 1030S tape recorder. Most signals were recorded at a distance of 2-5 m. Pre- and post-signalling behaviour and circumstances in which signalling occur were observed to infer the meaning of the song. After editing, cuts of high quality recordings (a few seconds duration) were used for physical analysis (characteristics based on frequency and duration). In the present study, we used minimum frequency, maximum frequency, range of frequencies, duration of phrases and interval between phrases, to define the physical characteristics of the songs. The analysis was made with the help of Scientific 25 MHz Digital Storage Oscilloscope HM205-3, interfaced with a PC (Pentium) and signal analyzer software SP 91 (Bhatt *et al.* 2000). Spectrograms were generated with the help of DSP Sonagraph<sup>TM</sup> 5500 machine using SIGNAL<sup>TM</sup>, a software package for sound generation and analysis.

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## RESULTS

The female Oriental magpie-robin occasionally sings a short, low amplitude song in the presence of the male. In most cases ( $n=7$ ), they were observed singing alone. However, male and female were once seen singing a duet at a distance of about 25 cm. The female song consists of phrases, either similar (repetition of same phrase) or dissimilar in structure as observed in male birds. Minimum, maximum and range of frequencies were found to be  $2.42 \pm 0.03$ ,  $5.03 \pm 0.08$  and  $2.61 \pm 0.02$  kHz respectively, while the duration of phrases was  $1.38 \pm 0.02$  sec followed by an  $1.49 \pm 0.03$  sec interval (Fig. 1). Since the female sings rarely, only a few song samples could be recorded and the analysis is restricted to a few select phrases. Analysis of the data reveals that the female uses almost the same frequency pattern as the male birds do (Table 1). Interestingly, the female started singing before the male. Thus, it appears that in *C. saularis*, onset of breeding is indicated by female song. However, in some males ( $n=4$ ), the singing was initiated on listening to the song of neighbouring males. In two cases, the female was found singing at the time of the second brood, just before the

mating. It appears that the function of the female song in magpie-robin is to stimulate the male for (i) initiation of breeding activities (i.e. formation of breeding territory), and (ii) courtship.

## DISCUSSION

Our results reveal that the female *Copsychus saularis* sings rarely, and uses almost same frequencies as male birds. However, the maximum frequency, range of frequencies and relative amplitude was found to be higher in males (Table 1). The female rarely sings. It seems that the biological significance of the female's song is restricted to initiating the males to sing, while in males the song is common during breeding and is used for territorial defence and mate acquisition (Bhatt *et al.* 2000).

In many species of birds and mammals, both the sexes live together throughout the year but courtship takes place when a female gives signs of readiness in the form of olfactory/vocal/visual cue(s). In the magpie-robin group, females normally use singing for this purpose. In the polygynous redwinged blackbird, *Agelaius phoeniceus* of North America, Beletsky (1983)

TABLE 1  
COMPARATIVE ACCOUNT OF THE PHYSICAL AND ASSOCIATED CHARACTERISTICS OF SONG  
OF MALE AND FEMALE, ORIENTAL MAGPIE-ROBIN *COPSYCHUS SAULARIS*

S. No. Characteristics	Female	Male (Bhatt <i>et al.</i> 2000)
1. Number of individuals (N), studied	5	14
2. Number of samples (n), taken for statistical analysis (mean $\pm$ SE)	12	84
3. Minimum frequency (kHz)	$2.42 \pm 0.03$	$2.39 \pm 0.04$
4. Maximum frequency (kHz)	$5.03 \pm 0.08$	$5.41 \pm 0.07$
5. Range of frequency (kHz)	$2.61 \pm 0.02$	$3.19 \pm 0.11$
6. Duration of phrases (sec)	$1.38 \pm 0.02$	$1.52 \pm 0.05$
7. Interval between phrases (sec)	$1.49 \pm 0.03$	$1.09 \pm 0.04$
8. Relative amplitude	Low	High
9. Use of song	Rare	Common in breeding season
10. Conspecific context	Always observed in the presence of male	Irrespective of the presence / absence of female
11. Biological function	Probably initiate the males to sing	For territory advertisement and mate acquisition

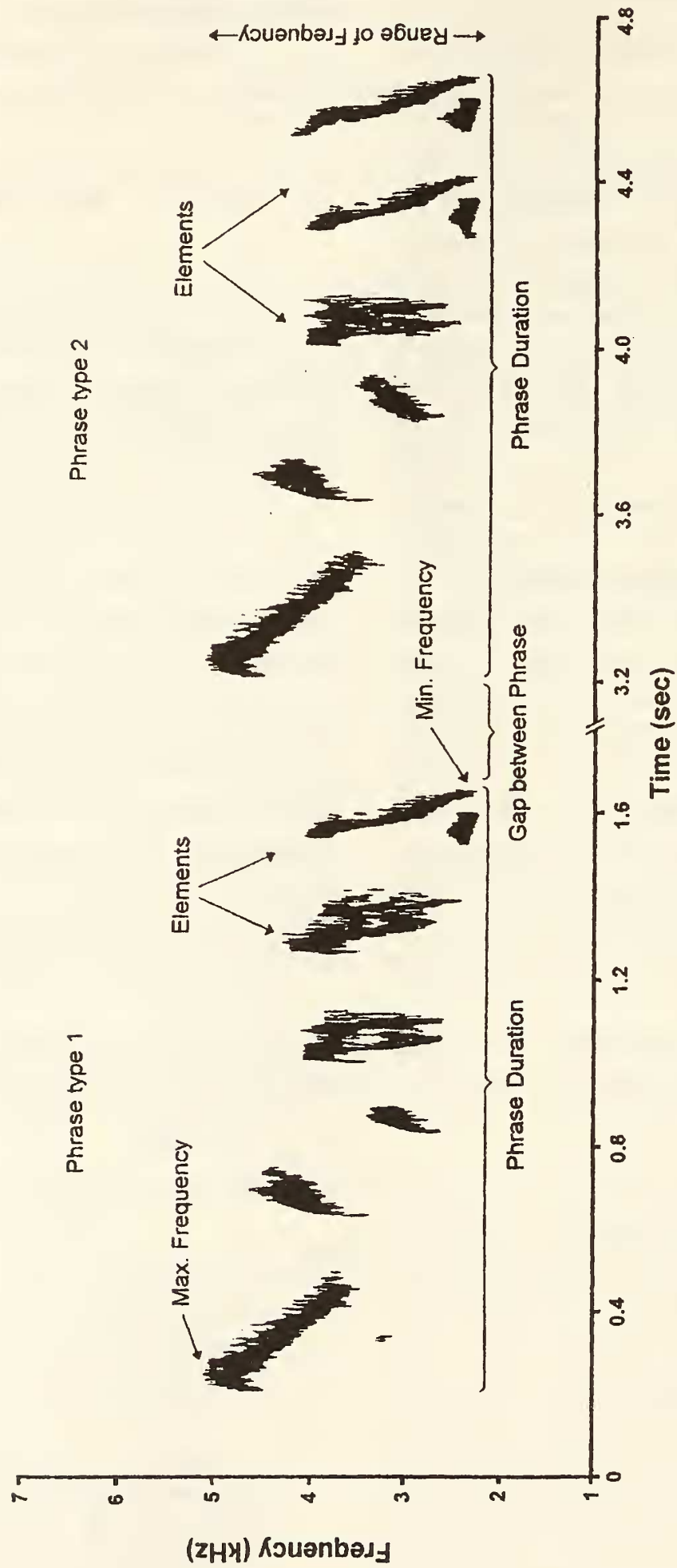


Fig. 1: Spectrogram of the song of the female Oriental magpie-robin *Copsychus saularis* showing the different physical characteristics, namely maximum frequency, minimum frequency, range of frequency, duration of phrases and interval between phrases.



found two types of female song with varied functions. These songs probably help in communication between the mated pair and are aggressive signals. As in the Oriental magpie-robin, the song of the female European robin, *Erithacus rubecula* is shorter and simpler than the male song (Lack 1946). Female white-crowned sparrow, *Zonotrichia leucophrys* also produce a song, which is structurally similar to that of the male, but usually shorter in duration (Baptista *et al.* 1993).

In the European robin, *Erithacus rubecula* the female song is clearly related to the winter territorial behaviour (Hoelzel 1986), while in Oriental magpie-robin the female generally does not exhibit territorial behaviour. However, during breeding if a predator appears in the territory, the female helps the male to chase it away, both producing threat calls. The female was never observed chasing conspecifics during this study. In Northern cardinals, *Richmondia cardinalis*, Ritchison (1986) found that females sang during a particular phase of the breeding cycle, just before nesting, and there was no evidence from field observations or playback experiments that female song helped to establish or defend territory, just as in the Oriental magpie-robin.

The song of the Northern cardinal seemed to stimulate the males to join in and sing as well. It is suggested that female song in cardinals might function in pair bonding or synchronising reproductive physiology (Ritchison 1986, Moller 1991).

The present study indicates that the magpie-robin is a good model to study the functional significance of song of female birds. It provides basic information on the song of the female magpie-robin. A detailed study is required to know the repertoire of female song and its functional significance.

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